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MASSACHUSETTS  
GOVERNMENT  
OFFICE OF  
ENVIRONMENTAL  
AFFAIRS

# annual report 1973

MASSACHUSETTS DEPARTMENT OF NATURAL RESOURCES

*Executive Office of Environmental Affairs.*



FRANCIS W. SARGENT  
*Governor*

FRANCIS W. SARGENT  
*Governor*

CHARLES H. W. FOSTER  
*Secretary of Environmental Affairs*

ARTHUR W. BROWNELL  
*Commissioner of Natural Resources*



CHARLES H. W. FOSTER  
*Secretary Environmental Affairs*

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#### BOARD OF NATURAL RESOURCES

William S. Brewster  
Joseph W. Lund

Frederick G. Crane, Jr.  
Arnold D. Rhodes



ARTHUR W. BROWNELL  
*Commissioner*

#### DIVISION DIRECTORS

Conservation Services	Matthew B. Connolly
Forests and Parks	Bruce S. Gullion
Law Enforcement	Kenneth A. Crossman
Marine Fisheries	Frank Grice
Mineral Resources	Robert C. Blumberg
Water Pollution Control	Thomas C. McMahon
Water Resources	Charles F. Kennedy
Acquisition & Construction	Richard J. Correia



*The Commonwealth of Massachusetts*  
*Department of Natural Resources*  
*Leverett Saltonstall Building*  
*100 Cambridge Street, Boston 02202*

As a state agency responsible for the protection and wise management of the Commonwealth's water and land resources, the Department of Natural Resources has always been concerned with man and his relation to the environment. Ever since it was organized in 1919, and throughout its evolution into a multi-agency organization, the Department has devoted its efforts to assisting communities and citizens of Massachusetts in making the Commonwealth a more productive and enjoyable place in which to live.

In this era of growing public concern over the environmental quality of life and vanishing natural resources, the Department's activities have expanded and intensified. Its functions of acquisition, development, enforcement and control of the state's natural resources have increased tremendously, while its work in research and technical assistance has kept pace with the growing public demand for enlightened environmental practices.

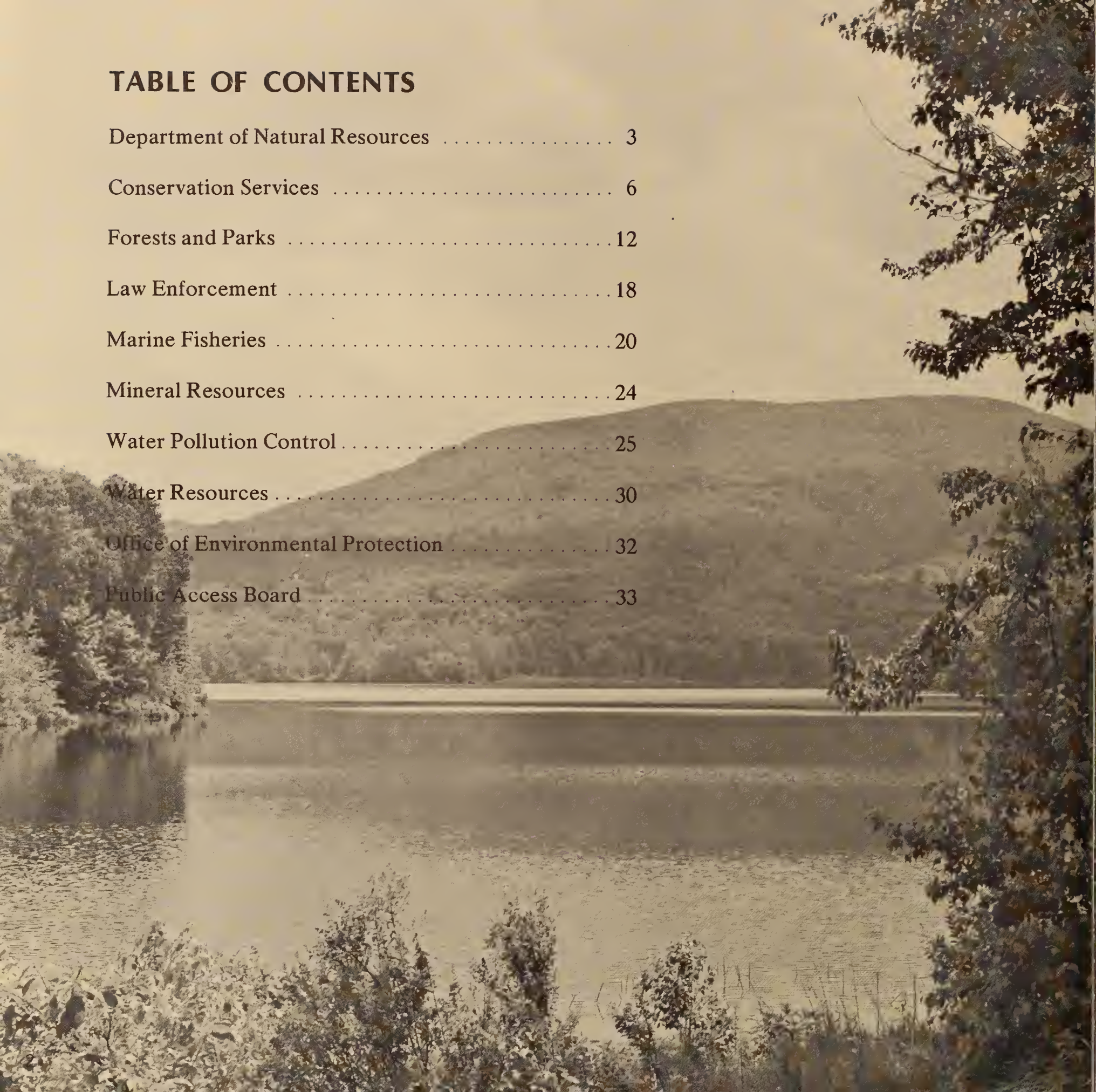
But today's environmental problems are complex and not easily solved. No government agency can solve them alone; they demand public understanding and cooperation. In the belief that an informed and enlightened public is fundamental to the task of environmental preservation and progress, this annual report attempts to provide an overview of the Department's responsibilities and programs, a record of its accomplishments, and an insight into some of the problems it will face in the remainder of this decade.

*Arthur W. Brownell*



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# department of NATURAL RESOURCES

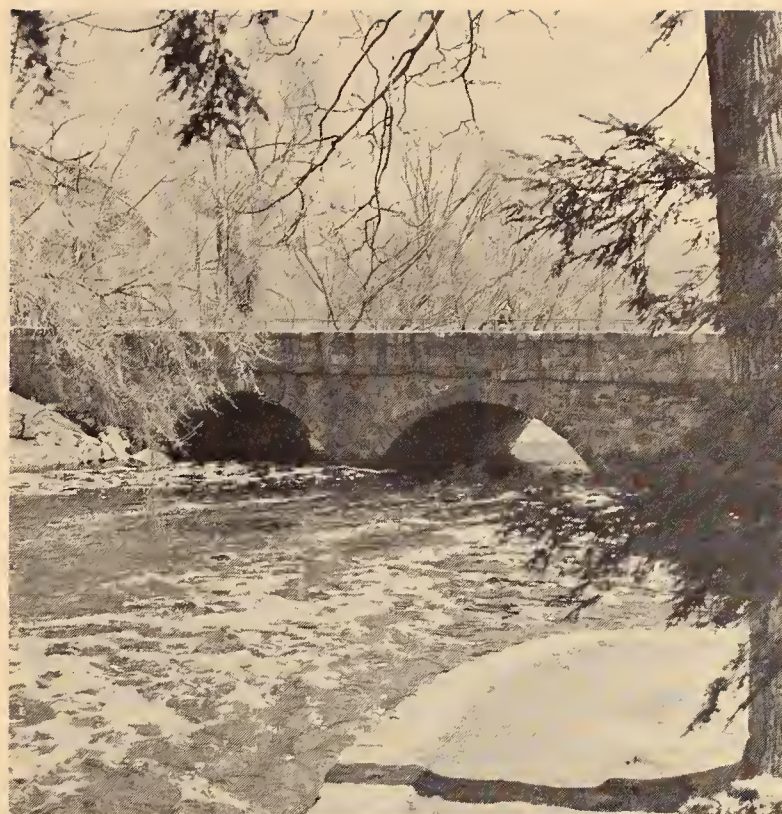
The Department of Natural Resources, established under Chapter 21, Section 1 of the General Laws, has the responsibility for the "care and supervision of the natural resources of the Commonwealth and its adjacent waters." Within the Department are the following divisions:

## DIVISION OF CONSERVATION SERVICES

Assists municipal conservation commissions in their efforts to preserve and acquire open space. The Division also administers the coastal and inland wetlands programs and the federal Land and Water Conservation Fund in Massachusetts. Its Bureau of Statewide Planning carries out statewide recreation and open-space planning, and a project planning unit, in conjunction with the Division of Forests and Parks, develops plans for recreational sites.

## DIVISION OF FORESTS AND PARKS

Manages all state forests, parks and several reservations and all state-operated ocean beaches, swimming pools and skating rinks outside of the Metropolitan Parks District. Under the Division's supervision are some 235,000 acres of land and water. Although the majority of Forests and Parks personnel is concerned with providing recreational opportunities for Massachusetts' residents and visitors, the Division is also actively engaged in the promotion of sound forestry practices, prevention and control of forest fires, and the suppression of insect pests.



The Charles River, So. Natick

## DIVISION OF LAW ENFORCEMENT

Enforces all hunting, fishing and trapping regulations as well as all laws relating to forests, forest fires and the operation of motorboats and snowmobiles. In addition, the Division's Natural Resource Officers investigate wetland violations, water pollution complaints and oil spills.

## DIVISION OF MARINE FISHERIES

Is responsible for the protection and development of the living marine resources of Massachusetts' coastal waters. This responsibility entails overseeing commercial fishing, supervising recreational saltwater fishing, assessing the impact of coastal development, and conducting research essential to proper marine resource management. The Division also administers all laws affecting marine fisheries and issues commercial fishing licenses.



## **DIVISION OF MINERAL RESOURCES**

Regulates leasing and licensing of the exploration and extraction of mineral resources beneath Massachusetts' coastal waters.

## **WATER RESOURCES COMMISSION**

Affiliated with the Department of Natural Resources is the Water Resources Commission, an 11-member board composed of the Commissioners of Natural Resources, Agriculture, Commerce and Development, Public Health, Public Works, and the Metropolitan District Commission, the Director of Fisheries and Game, and four public members appointed by the Governor. The Commission functions primarily as a water management body, coordinating the activities of federal, state and local agencies involved with the conservation, development, utilization and disposal of water. Administrative agencies operating under the Commission and within the Department of Natural Resources are the Divisions of Water Pollution Control and Water Resources and the Office of Environmental Protection.

## **DIVISION OF WATER POLLUTION CONTROL**

Is charged, under the Massachusetts Clean Waters Act of 1966, with the responsibility for establishing water quality standards, classifying all waters in the Commonwealth, and instituting and enforcing implementation schedules for meeting these standards. The Act makes it unlawful for any person to discharge into Commonwealth waters any substances violating water quality standards.

## **DIVISION OF WATER RESOURCES**

As the Commonwealth's primary water planning agency, is responsible for protecting and improving existing water resources and identifying the state's future water needs for agriculture, industry, recreation, wildlife and domestic consumption.



Fishing at the Delaney Flood Control Site





## PUBLIC ACCESS BOARD

Functions within the Department of Natural Resources with the Commissioner of Natural Resources as its chairman. Other Board members include the Commissioners of the Metropolitan District Commission and Public Works, and the Directors of Fisheries and Game and Marine and Recreational Vehicles. The Board provides boat launching facilities and access to the ponds, lakes, rivers and coastal waters of the Commonwealth.



Dedication of a new public access site.

## OFFICE OF ENVIRONMENTAL PROTECTION

In conjunction with the Bureau of Solid Waste Disposal in the Department of Public Works, is developing a solid waste management program for the Commonwealth.



## ADMINISTRATION

An executive staff assists the Commissioner of Natural Resources with the operation and administration of the Department. The staff's work includes drafting and interpreting legislation, establishing a liaison with the executive and legislative branches of state government, dispensing information to the public, and conducting planning and research.



# division of CONSERVATION SERVICES

## LAND AND WATER CONSERVATION FUND

The Land and Water Conservation Fund Act, administered by the U.S. Department of Interior's Bureau of Outdoor Recreation, was established in 1965. This Act allocates federal funds to states, and through the state, to political subdivisions, for planning, acquisition, and development of important public outdoor recreation areas. To be eligible for the 50 percent reimbursement under this Act, local and state agencies must submit projects which are in accord with the needs defined in the Statewide Comprehensive Outdoor Recreation Plan (SCORP). Conservation Services reviews and coordinates all BOR applications in Massachusetts. Together, BOR's Land and Water Conservation Fund and DNR's Self-Help Program can reimburse a community up to 75 percent of the cost of purchasing land for conservation and outdoor recreation purposes.

## PROJECTS APPROVED IN FISCAL 1973

RECIPIENT	PROJECT	REIMBURSEMENT
Auburn	27-acre playfield land acquisition	\$ 75,900
Boston	Tot lot redevelopments	124,200
	McConnell Park redevelopment	48,500
	Three playfield redevelopments	499,000
Brookline	Pierce playground redevelopment	38,900
Carlisle	252-acre Greenough Estate acquisition	192,600
Danvers	3-acre beach extension	37,000
Department of Natural Resources	Massasoit State Park impoundment	500,000
	Boston Harbor Islands acquisition — 185 acres	313,400
	State Comprehensive Outdoor Recreation Plan	249,000
	Brockton Swimming Pool	215,000
	Worcester Swimming Pool	235,000
	Lowell Swimming Pool	215,000
	Lawrence Swimming Pool	215,000
	Fall River Swimming Pool	220,000
	Sacramone and McGrann Playground redevelopment	74,700
Everett		
Great Barrington	29-acre beach acquisition	10,200
Harvard	Shaker land acquisition and redevelopment — 102 acres	124,200
Harvard / Bolton	Joint 91-acre acquisition	61,600
Holbrook	Playground floodlights	34,200
Medway	Medway Park redevelopment	121,000
Metropolitan District Commission	Melrose Swimming Pool	250,000
Milton	Kelly Field tennis courts reconstruction	14,200
Needham	222-acre Bradley Estate acquisition	462,500
Somerville	Trum Field redevelopment	186,000
Stoughton	78-acre conservation land acquisition	43,000
Wayland	121-acre conservation land acquisition	136,900





## THE SELF-HELP PROGRAM

Among the most successful grassroots conservation organizations in the nation are Massachusetts' conservation commissions. Out of 351 cities and towns in the Commonwealth, 319 now have conservation commissions. Composed of three to seven members appointed by the selectmen or mayor, a conservation commission is entrusted to preserve a locality's meadows, forests, marshes, fields and floodplains — in short, a community's open spaces. The commissions protect and preserve open space principally through the acquisition of land.

Any town or city having a conservation commission and a conservation-recreation open space plan is eligible to receive financial assistance under the Massachusetts Self-Help Act. Administered by Conservation Services, the Self-Help Program offers towns and cities up to 50 percent reimbursement for the cost of land purchased for conservation and outdoor recreation purposes. BOR's Land and Water Conservation Fund and the Self-Help Program may be applied together. In that case a community may receive up to 75 percent reimbursement for the cost of purchasing land.

Since the inception of the Self-Help Program in 1961, the state has reimbursed municipalities over \$5 million for 461 projects involving the acquisition of over 14,000 acres. In fiscal 1973, Conservation Services reimbursed communities \$750,000 for 46 projects involving 1139 acres. Among the major acquisitions with Self-Help funds last year were:

TOWN	ACREAGE	COST	STATE REIMBURSEMENT
Concord	92 acres	\$286,000	\$143,000
Carlisle	242 acres	385,000	96,300
Framingham	57 acres	317,900	79,500
Newton	34 acres	247,200	61,800
Sandwich	64 acres	93,200	46,600
Lexington	14 acres	63,000	31,500
Harvard	37 acres	42,500	21,200

## CONSERVATION RESTRICTIONS

While the Self-Help Program was a major factor in the acquisition by communities of open-space areas, 685 additional acres were protected last year under the Conservation Restriction Act (Chapter 666, Acts of 1969). This Act, administered by Conservation Services, enables a landowner to retain title to his property while remaining legally bound not to develop it. Since inception of the Act, 46 conservation restrictions in 30 communities, totalling 3354 acres, have been approved.



## WETLANDS REGULATIONS

### Inland Wetlands

As a pioneer in wetlands protection, the Commonwealth has consistently sought to strengthen its wetlands laws. Legislation consolidating the former inland (Hatch Act) and coastal (Jones Act) wetland laws became effective on October 16, 1972. The new legislation — Wetlands Protection Act (Chapter 784 of the Acts of 1972) — broadens the scope of environmental protection and grants local authorities greater control over wetlands development.

The Act is a regulatory law controlling, not banning, wetlands development. Lands subject to the law include: any bank, beach, dune, flat, marsh, meadow or swamp bordering the ocean; any creek, stream, river, pond or lake; or any land subject to tidal action, coastal storm flowage or flooding.

Under the law, municipal conservation commissions (or the local governing body if there is no commission) are required to hold hearings to determine whether development on a wetland will have any adverse effect on water supplies, storm and flood prevention, pollution prevention or fisheries protection. Upon determination, the commission must issue a set of conditions for the developer to follow to insure no adverse effects. The Department of Natural Resources retains the authority to review cases and issue superceding orders if requested by an aggrieved person, ten citizens of the town, an abutter or the Commissioner of Natural Resources.

Wetlands protection is also being implemented under another law — the Inland Wetlands Protection Act of 1968 (Chapter 131, Section 40A). This Act grants the Commissioner of Natural Resources authority to restrict development on wetlands before plans for their alteration are undertaken.

Although restrictions have been proposed for about 2900 acres of wetlands in the towns of Sherborn, Dedham, Needham, and Westwood, presently only about 500 acres in the towns of



A small marsh in central Massachusetts provides flood protection, water storage and a home for wildlife.

Wellesley and Dover have been restricted under the Inland Wetlands Protection Act.

But indications last year signified that the wetlands program is ready to move ahead. Implementation has been expedited by utilizing aerial photography for mapping wetlands. In Barnstable County and Martha's Vineyard, aerial photography of wetlands in 17 communities has been completed. Wetland areas in the Charles and Neponset watersheds have also been delineated by aerial photography.

On its own initiative, the Town of Marlboro has undertaken aerial photography and wetland delineation. And other towns have begun to undertake their own wetlands delineation. In the coming years, the Division's work load should be further alleviated and more rapid progress made as conservation commissions, watershed associations and citizen groups take over much of the tedious ground-checking and investigation of wetland ownership.





The Barnstable Marshes and Sandy Neck

### Coastal Wetlands

Encouraging progress has been made in coastal wetlands protection. To slow down the destruction of coastal wetlands due to uncontrolled land development, the Commonwealth in 1963, passed the Jones Act (which has been consolidated into Chapter 784 of the Acts of 1972). The Jones Act granted the Department of Natural Resources power to regulate dredging or filling activities that could be harmful to marine life.

Two years later, under the Coastal Wetlands Protection Act (Chapter 130, Section 105), additional regulatory authority was granted to the Department to protect tidal marshes by restricting their uses. As of June 30, 1973, more than 25,300 acres of salt marshes and tidal flats, from Salisbury to Westport, have been preserved by restricted

usage. Orders are pending on other acreage which, if added to the present total, would cover 40,000 of the approximately 45,000 acres of coastal wetlands in Massachusetts.

Last year Conservation Services launched a unique program to restrict and preserve both coastal and inland wetlands. The Division, in cooperation with the Raytheon Company, has completed aerial surveys and wetlands inventory maps that will provide the basis for protecting 400 square miles of coastal and inland wetlands in Barnstable County on Cape Cod. For its pioneering role in protecting coastal wetlands, the President's Council on Environmental Quality, in a nationwide survey on land-use control, cited Massachusetts' coastal wetland restrictions as a highly successful program.



## PLANNING

Within the Division of Conservation Services, two planning units function under the aegis of its Bureau of Planning: the Statewide Planning Unit and the Project Planning Unit.

### Statewide Planning

The major task of the Statewide Planning Unit is the preparation of a Statewide Comprehensive Outdoor Recreation Plan (SCORP). This plan is a requirement of BOR's Land and Water Conservation Fund, but its ultimate purpose is to provide the Commonwealth with a master plan for best meeting the recreational needs of Massachusetts citizens in the years ahead. The plan includes several components: an inventory of existing recreational lands, an assessment of recreational programs, an evaluation of recreation needs across the state, and recommendations of the actions required to meet those needs.







The Brewsters: outermost of the Boston Harbor Islands

### Project Planning

This unit performs several functions, including: conducting studies to determine the land use capabilities of property owned or considered for acquisition by the Department of Natural Resources, and the preparing of plans for individual parks and projects. For example, the Unit, in conjunction with the Division of Forests and Parks, designed plans for more than 20 different projects last year. Among these were:

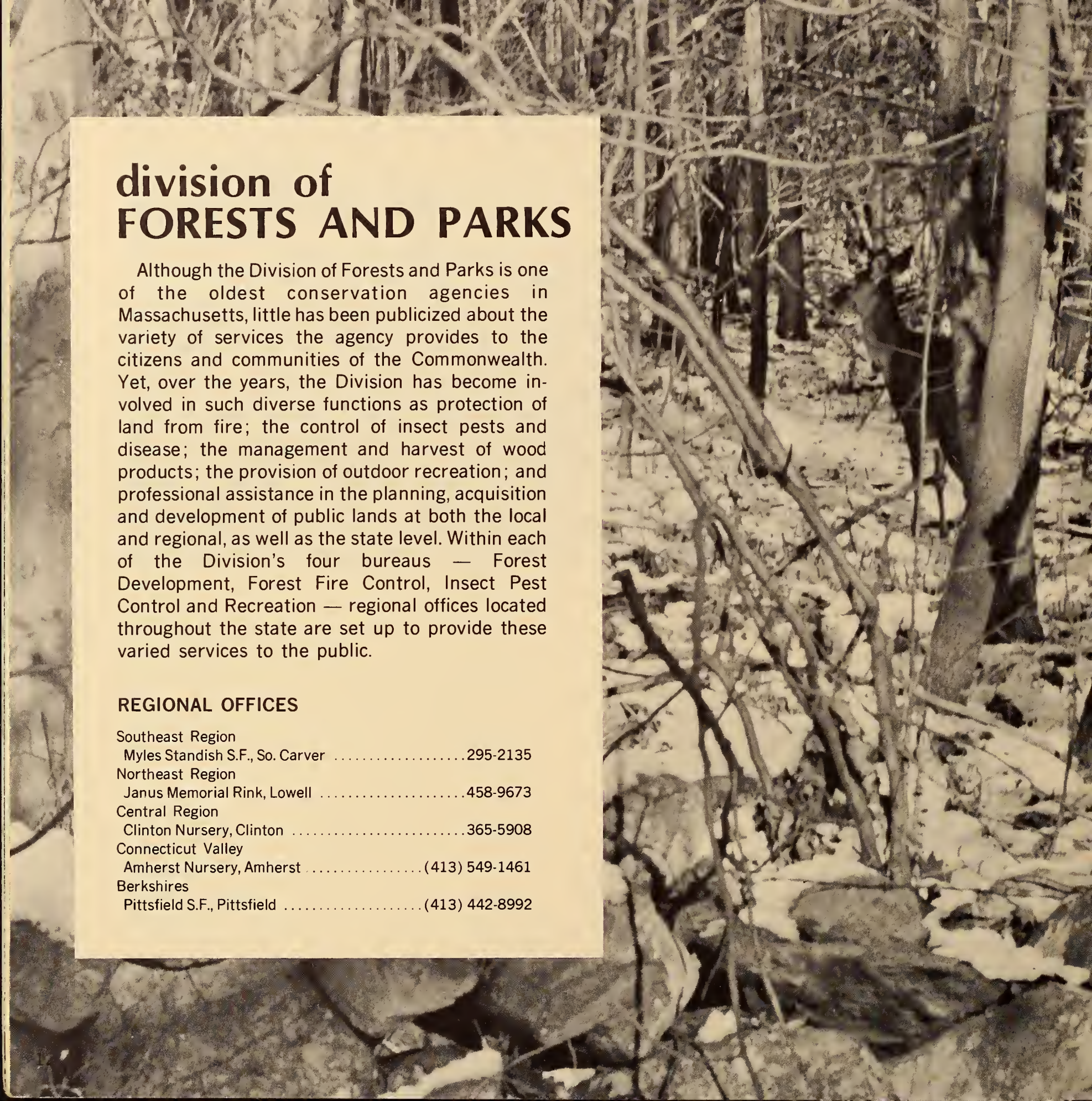
- a protection plan for the Holyoke Range in the Connecticut River Valley
- a trail development plan for Borderland State Park in Sharon-Easton
- improvement plans for Nickerson State Park in Brewster and for Lowell-Dracut State Park

- development plans for the French King area in Gill, Hawksnest Pond in Harwich, Moore Memorial State Park in Paxton, Meadow Site in North Brookfield and New Braintree, South Cape Beach in Mashpee, Pequot Pond in Westfield, and the west branch of the Westfield River in Middlefield.

### Planning Support Services

Supporting the two planning units are editorial, graphics, and research sections. Last year the editorial and graphics sections, in addition to their planning functions, published an environmental newsletter entitled **Environmental Resource**. The research section continued to survey unique natural areas in Massachusetts, and in cooperation with the U.S. Park Service, conducted a survey of national natural historical landmarks in the state.





## division of FORESTS AND PARKS

Although the Division of Forests and Parks is one of the oldest conservation agencies in Massachusetts, little has been publicized about the variety of services the agency provides to the citizens and communities of the Commonwealth. Yet, over the years, the Division has become involved in such diverse functions as protection of land from fire; the control of insect pests and disease; the management and harvest of wood products; the provision of outdoor recreation; and professional assistance in the planning, acquisition and development of public lands at both the local and regional, as well as the state level. Within each of the Division's four bureaus — Forest Development, Forest Fire Control, Insect Pest Control and Recreation — regional offices located throughout the state are set up to provide these varied services to the public.

### REGIONAL OFFICES

#### Southeast Region

Myles Standish S.F., So. Carver .....295-2135

#### Northeast Region

Janus Memorial Rink, Lowell .....458-9673

#### Central Region

Clinton Nursery, Clinton .....365-5908

#### Connecticut Valley

Amherst Nursery, Amherst .....(413) 549-1461

#### Berkshires

Pittsfield S.F., Pittsfield .....(413) 442-8992



## BUREAU OF FOREST DEVELOPMENT

In recent years, significant changes have taken place in the field of forestry. Formerly our foresters were engaged primarily in forest products management. Today, foresters are increasingly involved in assisting communities and private forest owners with such aspects of the total forest environment as open space preservation and land use planning.

In the town of Westport, for example, one of our foresters assisted the local conservation commission in formulating a reforestation requirement for a developer involved in a wetlands violation. This assistance should result in an aesthetically attractive tree planting adjacent to a housing development.

In South Worcester County, a forester assisted the Old Sturbridge Village Corporation in setting up a forest improvement program relating to the corporation's plans for establishing an old-time sawmill and logging demonstration.

In cooperation with the U.S. Forest Service's Cooperative Forest Management Program, a state forester helped the town of Pepperell earn \$1500 from the sale of white pine timber in the town forest. The present cutting will also serve to sustain and perpetuate this woodland as a healthy, vigorously growing forest.

All told, the Division's foresters last year assisted some 3000 forest owners in weeding, thinning, pruning, harvesting and marketing their forest land crops, helping these owners take advantage of not only the commercial value of their land, but the recreational and aesthetic value as well.

Supporting the various forest improvement programs is a special tax incentive law in the Commonwealth. Chapter 61 of the Massachusetts General Laws (revised in 1969 by Chapter 873) allows forest land to be valued at no more than \$10 per acre if the owner of 10 or more acres (valued at not over \$400 per acre at the time of application) practices forest management to improve the quantity and quality of a continuing forest crop.

This tax incentive, coupled with sound forest management and timber harvesting, is helping to provide forest owners with a feasible alternative to selling off their land to developers. Last year 53 Certificates of Forest Management were issued, classifying nearly 4500 acres in the state for a tax incentive for sound forest management. There are now over 300 forest land owners holding nearly 35,000 acres of woodlands under this program.

The forest products industry also received assistance from state foresters. In Plymouth County, a forester helped a sawmill company with the processing and marketing of woodchips. (This wood by-product, once treated as sawmill waste, is now almost a scarcity in eastern Massachusetts due to the great demand for the material as mulch). The Middlesex County forester helped a large post and pole company obtain a quantity of post material from the towns of Dunstable, Reading and Pepperell by assisting these communities in selling thinnings from their Red Pine plantations.

In the past decade, Massachusetts has ranked seventh in the nation in increase of value added in lumber and wood products per employee. In large part this position can be attributed to the many secondary wood manufacturing companies in the state, but also to the work of foresters in increasing timber sales (sales that can generate a dollar value in a local economy as much as 50 times the value of the standing timber). Massachusetts' timber harvest boosted the state's economy by some \$2.5 million last year.

Although the activities of the Bureau of Forest Development continue to expand both in scope and variety, much of our foresters' time and energy is still devoted to woodland management on 235,000 acres of state forests and park lands. Last year state foresters supervised the cutting and marketing on state lands of over 1.3 million board feet of timber. Both the inventorying and marking of state forest timber, as well as the planning and maintenance of forest roads and trails continue to be a vital part of their work.





## BUREAU OF FOREST FIRE CONTROL

Last year in terms of forest fire destruction, state fire fighters experienced one of their best years in recent history. Only 3900 fires broke out, burning about 5250 acres of land. The cost of extinguishing fires totalled about \$130,000 or approximately \$24.80 an acre. Fires set by careless smokers, campers, children playing with matches or arsonists continued to be the cause of the vast majority of fires.

Last year's excellent fire control record was in part due to unusually rainy weather. But the record can also be attributed to the Bureau of Fire Control's fire prevention program. As part of their effort in fire prevention, the Bureau continued to promote educational programs featuring **Smokey the Bear**. More than 326,000 persons in the Commonwealth were exposed to fire prevention programs last year.

To assure the continuance of an effective fire control system, state fire fighters upgraded fire towers, fire roads and equipment and improved communications and assistance in forest fire suppression to local communities. Plans were also completed for an aerial detection system that would be used to locate and report forest fires from fixed-wing aircraft. Aerial surveillance should greatly enhance the fire control system in the coming years.

A major innovative technique in forest fire fighting was also introduced last year. Water buckets attached to helicopters have been purchased to fight small fires. The helicopter will be the first line vehicle to control fires on the recently acquired Boston Harbor Islands. Massachusetts may be the first state to establish a forest fire patrol at sea. The Department hopes to obtain several boats to develop a fire prevention and suppression system for the Harbor Islands.



## BUREAU OF INSECT PEST CONTROL

In the never-ending war against insect pests, the Bureau of Insect Pest Control turned its efforts to research last year. This research effort, facilitated by the establishment of cooperative agreements with the U.S. Department of Agriculture's Forest Service and Agricultural Research Service, is specifically aimed at controlling the Commonwealth's worst insect pest — the Gypsy Moth.

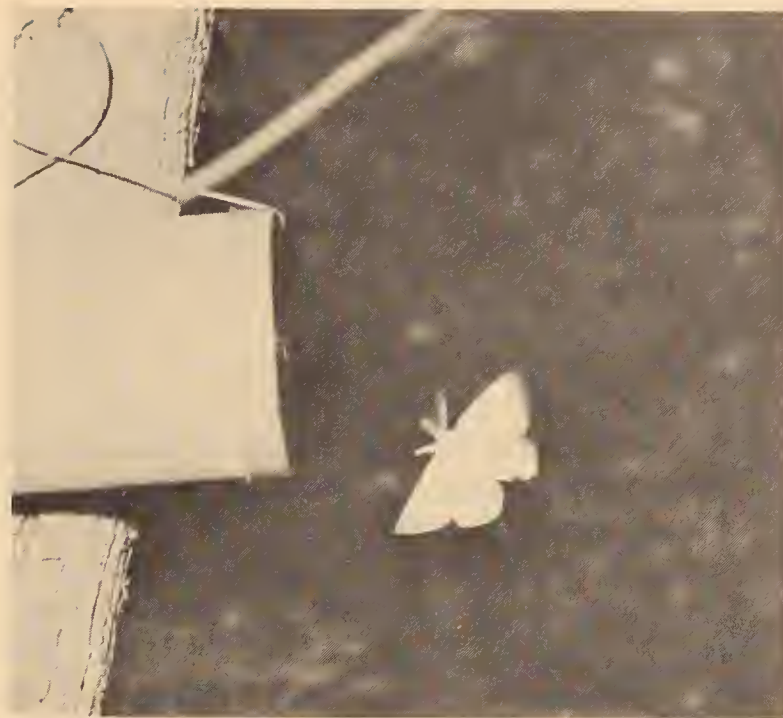
Although damage to trees by the gypsy moth slowed in Massachusetts compared to the toll in other states, the insect pest defoliated a considerable amount of acreage last year. On Cape Cod, 15,000 acres were defoliated by the gypsy moth. Nearly 2000 acres in Southeast Massachusetts and 7000 acres in the Connecticut Valley were also defoliated.

The Bureau, in cooperation with the U.S. Forest Service, is working on several gypsy moth projects. One project calls for an intensive study of gypsy moth population fluctuations to determine whether to spray specific areas in the state.

Another project involves the study of gypsy moth parasites and predators. Research into the efficacy of natural controls of the gypsy moth has been generally neglected over the last 25 years.

The most interesting program of gypsy moth control — one that is unique in the nation — involves manipulation of the gypsy moth's sex life. Last year the Bureau began experiments to determine whether gypsy moth populations can be controlled and depressed through the use of chemical sex attractants. Conducted in cooperation with the Agricultural Research Service, the experiment involves the use of a synthetically produced sex lure called Disparlure.

As a perfume, Disparlure simulates the natural odor given off by the female gypsy moth to attract males. The chemical attractant, which is non-toxic and inexpensively produced, was sprayed over 16,000 acres of state forest lands lightly infested with gypsy moth populations in the towns of Erving, Northfield and Warwick.



Male gypsy moth entering census trap

It is believed that when Disparlure is sprayed throughout the forest, the male gypsy moth becomes very confused and flutters around, alighting everywhere but never actually mating. The theory is no mating, no progeny and, therefore hopefully, an eventual decline in the gypsy moth species.

Another major problem is the Dutch Elm disease. As the disease spreads unabated throughout Massachusetts, landowners, communities and the Commonwealth continue to lose thousands of elm trees annually. Presently the only effective method to control the disease is to remove the elm; but tree removal is costly, running as much as \$500 per tree.

Now, however, science may be on the verge of a major breakthrough in the battle against the Dutch Elm disease. Tree specialists have developed an antibiotic called Nystatin which is injected into the vascular system of the diseased elm. Some 100 elms were cured by this method last year. A similar method currently being tested by the Bureau and other agencies is the injecting or spraying of elms with a fungicide called Benomyl.



## BUREAU OF RECREATION

Use of state recreational land and facilities continues to soar. In 1968, 2 million people used facilities of the Department of Natural Resources generating revenues of \$485,000. Since that time the Department added four major state parks, built 16 skating rinks and 16 swimming pools and assumed the management of four coastal beaches. By 1973, attendance swelled to over 8 million people, a 400 percent increase over 1968. Revenues for the use of Department recreational facilities increased to over \$2.4 million, a 500 percent increase over 1968.

To keep pace with this burgeoning demand for outdoor recreational opportunities, the Division continued its two major programs: land acquisition and expansion, and park renovation and improvement. Particular emphasis was placed last year on the development of recreational trails. An initial 48 miles of bicycle trails (the 8-foot-wide paved bike trails will be adaptable for snowmobiling in winter at some locations) are being planned for 5 state forests or parks. These include:

Myles Standish	Plymouth & Carver	16 miles
Wompatuck	Hingham	12 miles
Martha's Vineyard	Martha's Vineyard	10 miles
Nickerson	Brewster	8 miles
Chicopee Memorial	Chicopee	2 miles

An additional 75 miles of multiple-use trails is presently under construction. These trails, which can be used for hiking, horseback riding and cross-country skiing, will be developed in:

Savoy Mt. — Florida	Savoy and Florida	25 miles
October Mt.	Lee and Lenox	24 miles
Beartown	Monterey & Great Barrington	20 miles
Pittsfield State Forest	Pittsfield	6 miles







In addition to the trail construction program, about 90 miles of road renovations are underway, beginning with the repair of a 16-mile roadway running through Mt. Greylock State Reservation from Lanesborough to North Adams.

A campsite construction program to narrow the gap between supply and demand for outdoor recreation and camping facilities is also underway. By 1974 the Department will have completed construction of 950 campsites, bringing the total of state-operated sites to 3,350, an increase of more than one-third over camping facilities provided in 1971.

Some Department parks and forests lack sufficient water to support recreational activities like swimming, boating and fishing. Consequently, the Department has turned to dam construction to create artificial impoundments or to achieve better control of water elevations at existing ponds and lakes.

Currently under construction at Massasoit State Park in Taunton is a dam that will create a 250-acre impoundment called Lake Rico. This \$900,000 project, half of which will be reimbursed to the Department by federal funds from the Bureau of Outdoor Recreation's Land and Water Conservation Fund, will make Massasoit a first-rate day-use park. Included in the project will be a beach that can accommodate 2000 people and a fish ladder that can handle an alewife run of at least 100,000. Lake Rico will provide excellent opportunities for swimming, boating and fishing for pickerel, bass and perch.

The cost of all these renovations and improvements — comfort stations, visitor centers, dams, campsites, trails and roads — is \$9 million.

**The Rinks and Pools Program** continued to expand last year. The number of skating rinks doubled from 8 to 16 and the number of swimming pools increased from 9 to 16.

## ACQUISITION

The first phase in developing the Boston Harbor Islands into a unique ocean-based urban park is completed. Last year the Department acquired 13 privately owned islands. The cost of acquisitions was about \$700,000, one-half of which is reimbursed to the state by the federal government under the Bureau of Outdoor Recreation's Land and Water Conservation Program. These acquisitions assure that virtually all the Harbor Islands will be safe from development. Hereupon, the way will be open to begin desperately needed erosion control on many of the islands.





## division of LAW ENFORCEMENT

As public concern for environmental protection continues to grow, the Division of Law Enforcement has expanded its areas of surveillance. Much of the time and energy of the Division's 73 law enforcers has been devoted to the enforcement of hunting, fishing, and trapping regulations, as well as laws relating to forests, forest fires and the operation of motorboats and snowmobiles. But under the coastal and inland wetland protection laws, the Division has also become involved in the detection of wetland violators and the prevention of further wetland destruction. With the acceleration of the Massachusetts Clean Waters Program, Law Enforcement, in conjunction with the Division of Water Pollution Control, has increased its efforts to report oil spillers and other water polluters. Last year 33 water pollution violations were reported by Natural Resource Officers, resulting in 17 convictions.

Over the years, Law Enforcement's Hunter Safety Training Program — education of minors in firearms safety — has significantly contributed to the reduction of firearm accidents. Last year the

Division instructed more than 2800 youngsters between the ages of 14-17 in the proper handling of guns. Since 1955, more than 53,000 youngsters have received certificates of competency enabling them to obtain hunting licenses. While carelessness, ignorance and horseplay continue to cause accidents, no small part of the zero hunting fatalities in Massachusetts last year can be directly attributed to the gun safety program.

Recently, under the Federal Aid in Wildlife Restoration Act Amendment of 1970 (P.L. 91-503), the Hunter Safety Training Program received a further boost. Money is now available for funding the program on a 75 percent federal, 25 percent state basis. This increase in funds enables improvement of gun safety instruction and provision of student hunter safety kits for all youngsters in the program.

One of the greatest assets of the Division is a recently acquired 45-foot, high-speed, radar-equipped aluminum craft. Called the "Jessie," the boat is used to patrol coastal waters in search of polluters and to crack down on marine violators illegally possessing lobsters, tampering with lobster gear, or dragging inside restricted territorial limits. Patrol statistics indicate that this boat, which logged 12,000 miles last year, has the capability of covering at least double the area of the former wooden-hulled craft.

The efficiency made possible by modern equipment and stream-lined investigative procedures has paid off for Law Enforcement; of the 826 inland, marine, motorboat and snowmobile violations requiring court action last year, 634 of these resulted in conviction.

Upgrading of operations was especially important in light of the "Red Tide" outbreak last year. The "Red Tide" (*gonyaulax tamarensis*) invasion along the inshore areas of our coastline required prompt action by the Massachusetts Department of Public Health in ordering closures of harvesting, sale and distribution of all shellfish imports and exports. Augmented by both



helicopter and boat patrols, Law Enforcement initiated an immediate 24-hour surveillance of all shellfish areas during the emergency that lasted several months. Natural Resource Officers stationed in inland areas worked with Public Health inspectors to enforce the statewide embargo and condemnation of shellfish. Although there were 27 cases of the "Red Tide's" Paralytic Shellfish Poisoning in Massachusetts (no fatalities), no cases were reported after preventive patrols were instituted.

Protecting our natural resources, however, is no easy task. In recent years the Department of Natural Resources has expanded its park, forest and beach facilities and launched a statewide skating rink and swimming pool construction program. All these state landholdings must be safeguarded. In addition, a good part of the Division's daily operations includes the protection of life and property, searching for lost persons, recovering lost or stolen boats and equipment, and aiding people in distress.

Public demand for more and better protection, along with the growing difficulty in understanding and enforcing the outpouring of new environmental legislation, necessitates the Natural Resource Officer be not only game warden and policeman but legal prosecutor as well.

Regional Enforcement Officers are at the following locations:

Region I	— Department of Natural Resources, Boston: 727-3190
Region II	— Rutland State Park, Rutland: 886-6333
Region III	— Bradley Palmer State Park, Topsfield: 887-5931
Region IV	— Wompatuck State Park, Hingham: 749-1939
Region V	— Brimfield State Forest, Brimfield: (413) 245-9966
Region VI	— Myles Standish State Forest, Plymouth: 295-2135
Region VII	— D.A.R. State Forest, Goshen: (413) 268-7098
Region VIII	— Bradley Palmer State Park, Topsfield: 887-5931 (Marine)

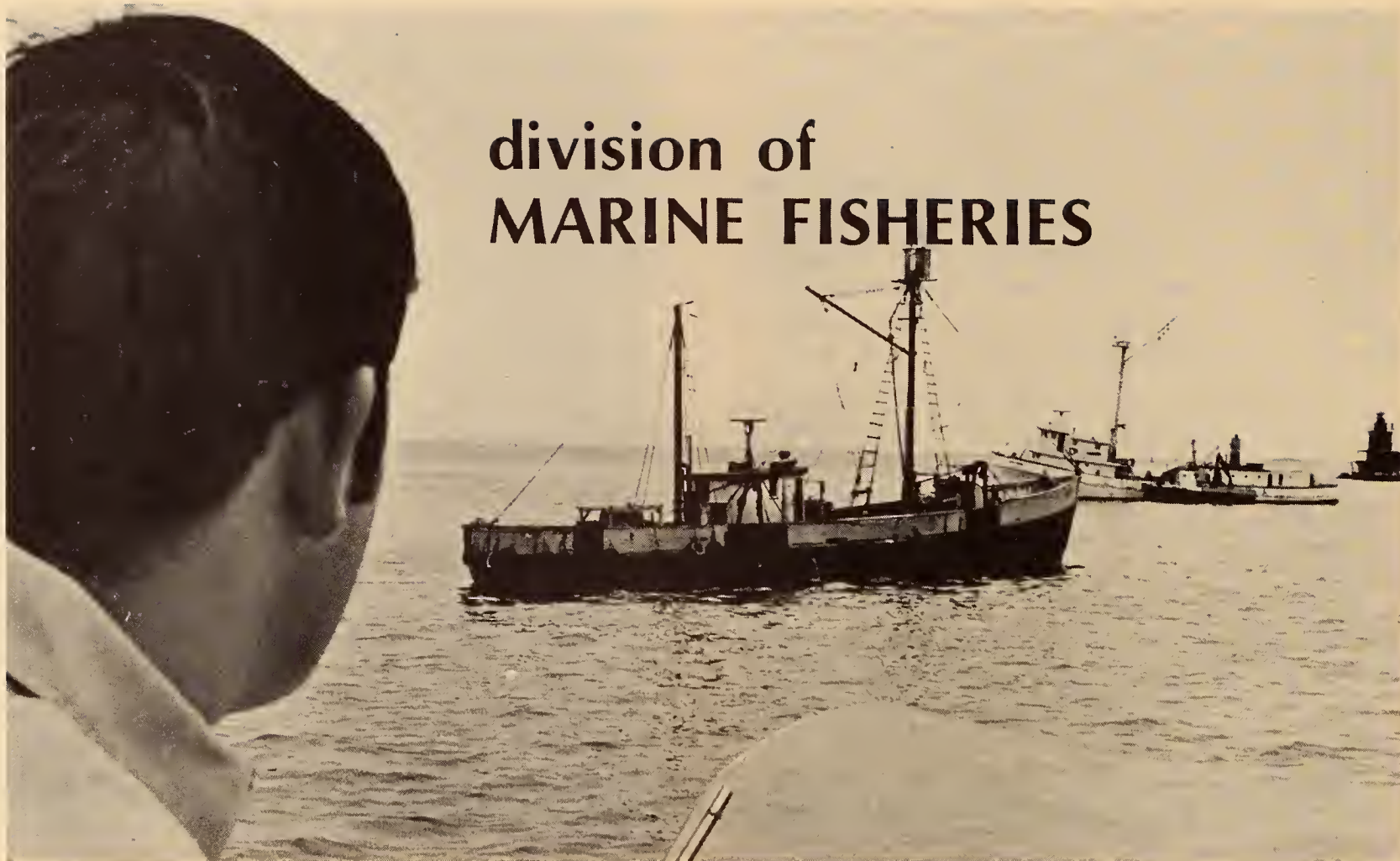
## MAJOR HUNTING AND FISHING OFFENSES — FISCAL 1973

Inland offense	Number of Complaints	Convictions	Fines Imposed
Fishing without a license	152	140	\$2,345
Hunting without a license	18	14	180
Hunting after hours	26	18	340
Falsification of statement to procure license or application	88	57	1,490
Fishing in closed season	12	11	160
Loaded shotgun in motor vehicle	29	27	955
Illegal possession of deer	25	17	410
Hunting in closed season	31	27	750
<b>Marine offense</b>			
Lobstering without a license	17	13	115
Possession of short lobsters	26	23	3,020
Digging clams in contaminated area without a permit	31	13	475
Taking fish or shellfish without a license	18	13	75
Dragging in closed waters	11	7	120
Illegal taking of striped bass	2	1	27,000



Division patrol boats, "Jesse" and "Lula May" logged 18,624 miles during the year.





## division of MARINE FISHERIES

Photo by the Quincy Patriot Ledger

The outbreak of the "Red Tide" in Commonwealth waters dominated the Division's activities last year. The "Red Tide" was a bloom of toxic planktonic organisms that infected soft-shell clams and mussels, and caused a reported 27 cases of Paralytic Shellfish Poisoning (PSP). No one knows when or if the "Red Tide" will occur again in Massachusetts. But if it does strike again, the state will be better prepared to cope with the outbreak. Marine Fisheries, in cooperation with the Department of Public Health, has implemented a monitoring program to provide an early warning of the organism's appearance. If a reoccurrence does appear, the area can be promptly closed down and the impact of the outbreak greatly reduced.

Despite its wide-spread occurrence in other

coastal areas, such as Canada, Maine and the West Coast, research into Paralytic Shellfish Poisoning has been inadequate. Therefore, the Division, in conjunction with the University of Massachusetts, is working to implement research that would aid in developing more effective monitoring and control techniques. Studies of toxin uptake and retention by various shellfish species will be undertaken by culturing the organism in the laboratory. Also, the conditions that favor growth and multiplication of the organism can be determined. Only by shedding some light on this natural "happening," can an unexpected reoccurrence of PSP — and its potential disastrous consequences — be avoided in the future.



## COMMERCIAL FISHERIES

Commercial fishing, the state's second oldest industry, struggled along despite the continued decline of stocks of commercially important fish. With haddock, once the mainstay of the Boston trawler fleet moving toward possible economic extinction, landings at the port of Boston were down from the previous year. The port of New Bedford reported a similar story; yellowtail flounder, the mainstay of that port showed a decline. Consequently, landings decreased 13 million pounds from the previous year. However, due to rising fish prices, and, in the case of the port of Gloucester a trend toward diversification, total value of 1972 landings at Massachusetts ports kept pace or increased over 1971. New Bedford's catch, down considerably in poundage, actually increased \$2 million more in value over the previous year.

One of the biggest fishery disappointments last year was the decline in offshore lobster fishing. The most recent data shows that lobster landings in 1972 were down nearly 50 percent from 1971 despite increased fishing effort. Catch declines, coupled with lobster gear losses due to trawling interference from fishing vessels, resulted in many offshore lobster fishermen facing bankruptcy. Inshore lobstermen fared little better as competition for inshore stocks increased from recreational and new commercial lobstermen.

Long-range prospects for the Massachusetts fishing industry are hardly encouraging either. In recent years the Northwest Atlantic — particularly George's Bank extending 50 to 250 miles off Nantucket — has been so overfished by foreign fleets that marine resources are rapidly dwindling. Haddock stocks have been declared a resource disaster by the federal government. Herring and yellowtail flounder fisheries are under restriction and other species such as cod, mackerel and lobsters are threatened. But despite pleas of both state and regional officials to decrease fishing efforts in the Northwest Atlantic, foreign fishing



Modern foreign vessels now fish George's Bank

effort increased 35 percent over 1971. As foreign nations modernized and increased their fleets, the domestic fishing industry continued to deteriorate and become antiquated.

Against this gloomy backdrop, Marine Fisheries continued its efforts to assist the industry. Aided by federal funds under the Commercial Fisheries and Development Act, the Division, through the Massachusetts Seafood Council, conducted marketing programs to promote fresh native seafood with state and midwest dealers. During the "Red Tide" outbreak, the program supplied factual information that helped counter adverse publicity about the crisis.

Through the Shellfish Technical Assistance Program, Marine Fisheries assists town and city agencies and individuals in shellfish management, culture, research and harvesting. Last year technical assistance was provided to 17 coastal towns. Large-scale projects undertaken included surveys of marine resources in Barnstable Harbor, Wellfleet and in the Apponagansett River in Dartmouth, "Red Tide" sampling and coordinating activities; and assistance to a federal commission investigating Paralytic Shellfish Poisoning.





## SPORT FISHERIES

Anadromous fish, such as alewives, shad and smelt, swim from the ocean upstream to spawn in freshwater streams and ponds. These species are valuable as game fish or food for larger fish and provide a vital link in the food chain. The Division's Bureau of Sport Fisheries operates several programs to protect and enhance anadromous fisheries including fishway construction and maintenance and propagation projects.

Last year fishways were rebuilt or upgraded on the Back River in Weymouth, Parker River in Byfield and Barkers Brook in Pembroke. In the propagation program, adult alewives were transplanted from the Herring River in Bourne to 12 lakes and ponds to establish new runs or enhance depleted ones. Two million smelt eggs were introduced into Sandwich Creek in Sandwich in an attempt to create a run of smelt. Over 4 million fertilized shad eggs were transplanted from the Connecticut River to the Taunton and Charles Rivers under the continuing program to establish shad in these watersheds.

The Division continued the experimental coho salmon program with growing signs of success. In the last three years the Division has purchased 300,000 coho salmon eggs from the state of Washington and hatched them at the Division of Fisheries and Game's salmon hatchery in Palmer. Surviving smolts (young salmon) from the eggs were stocked in the Indian Head River, and the number of salmon catches reported since the initial planting in 1971 has been encouraging.

In the fall of 1972 the first spawning run of mature coho salmon occurred. Division personnel collected 180 adult cohos, weighing from 3 to 12 pounds, as they returned to their original planting site on the Indian Head River. The eggs stripped from these cohos should yield as many as 80,000 "native" salmon smolts for stocking in the spring of 1974, thus hopefully, bringing to Massachusetts a new sport fishery.





Alewives were re-introduced into 12 lakes and ponds

## RESEARCH

The Division's Bureau of Research is in charge of research and field investigations essential to wise marine resource management. Two estuarine research teams — one based on the North Shore, the other on the South Shore — are surveying marine resources in estuaries from Salisbury to Westport. Last year studies were completed on the Taunton River-Mount Hope Bay, Bass River and Plymouth-Kingston-Duxbury Bay areas. "A Study of the Marine Resources of Essex Bay" (Monograph Series Number 13) was also published.

The Essex Bay study reported that soft shell clams were the most valuable marine resource in the bay, realizing a commercial value in 1969 of nearly \$220,000. Commercial lobstering was next in importance with a commercial value of \$21,000. The bay is also a popular sports fishing area; over 3000 fishermen annually seek winter flounder, Atlantic mackerel, striped bass and smelt. To aid in the management and wise utilization of marine resources in the bay, the report recommends, among other things, that the Gloucester salt marshes — because of their nutrient values, contribution to the food chain and habitat for fish and shellfish — be protected under the Massachusetts coastal wetlands acts.

The Division operates a lobster hatchery on Martha's Vineyard where last year lobsters were hatched and then released into coastal waters. Hatchery personnel were also involved in selective breeding of lobsters and artificial methods of stimulating lobster growth. A coastal lobster investigation team is planning to conduct lobster growth and migration studies in Buzzards Bay to determine the relationship between local and offshore stocks.

As the number of power plants increase to meet the state's growing energy needs, it becomes imperative to evaluate the effects of power generation, particularly on the coastal environment where many plants are now being built. Last year Marine Fisheries continued studies of the effects of power generation on the water quality and marine resources in Plymouth Bay, Cape Cod Bay and Salem Harbor.

There was one incident of an extensive fishkill due to power plant discharge last year. Division biologists determined that the killing of 35,000 menhaden in the discharge canal of the Pilgrim Power Station in Plymouth was caused by "gas bubble" disease. This condition, which was made lethal by the increased temperatures of the cooling water discharged from the power plant, was brought about by a natural super-saturation of oxygen and nitrogen in the sea water near the station. It is believed that only menhaden were affected because of their attraction to the warm water. The Division recommended measures to avoid future kills and has undertaken further studies into this phenomenon.

Operating in support of these ecological studies and other fishery projects is the Division's new Marine Research Laboratory at Cat Cove in Salem. Cat Cove's modern facilities include a saltwater tidal pool that provides exceptional research opportunities for shellfish and finfish culture and other investigations dealing with marine organisms. The main building houses a wet lab and larval culture area with a seawater system.



# division of MINERAL RESOURCES

As a state in which the population is steadily growing, Massachusetts requires ever increasing amounts of sand and gravel for landfill, building, and road construction. Yet the supply of sand and gravel is finite. As a result of this resource's depletion within a 20 mile radius of the city, the price of construction-grade sand and gravel has soared in Boston during the last five years. Even now, sand and gravel must be hauled from points as far away as New Hampshire.

One source of great potential lies beneath the Commonwealth's coastal waters. To determine the nature and locations of offshore mineral resources, the Division authorized a survey by Raytheon Company of Massachusetts Bay two years ago. This study discovered deposits containing more than 300 million cubic yards of potentially exploitable sand and gravel which was probably derived from glacial deposits and reworked by ocean waves and currents. At least one of the deposits may have been a barrier beach or bar submerged by a rising sea level several thousand years ago.

Because of the unknown impact of mineral extraction on other ocean resources, legislation was passed (Chapter 567, Acts of 1970) placing a moratorium on all marine mining until the Department of Natural Resources obtained information on its ecological implications. Upon collection and evaluation of this information, Mineral Resources will decide whether or not to grant licenses and leases for offshore operations.

To measure the environmental consequences of ocean dredging, Mineral Resources, along with the National Oceanic and Atmospheric Administration and several other government and private organizations, launched the New England Offshore Mining Environmental Study last year. Unfortunately, the NOMES project had to be ter-

minated after an exhaustive search failed to turn up any feasible disposal site for the project's sand and gravel.

However, before the project was terminated, valuable oceanographic data was collected. A sediment dispersion experiment in Massachusetts Bay utilizing tracer particles (clay-sized glass beads) was the most concentrated sampling and water current monitoring program ever undertaken by a state or the federal government. The information obtained will be used to assess the dispersal of clay and silt that could be released in the water during actual marine mining. The Division will continue to conduct research on the feasibility of allowing offshore mining of sand and gravel in Massachusetts coastal waters.

In anticipation of eventual jurisdiction over land-based sources of sand and gravel, Mineral Resources has renewed its efforts to develop studies in this area. The Division undertook a project to identify the size and location of all open mined pits in the state. The final report reveals that there are nearly 2400 such pits, totalling about 16,000 acres, in the Commonwealth. In addition, there are more than 520 abandoned or inactive pits occupying about 4000 acres. This data should help provide the basis for developing a system of priorities for mineral extraction and site restoration.



Tracer Particles spread in Cape Cod Bay.



# division of WATER POLLUTION CONTROL

The Federal Water Pollution Control Act Amendments of 1972 established a national goal of eliminating water pollution in America by 1985. The Bill inaugurated a two-phase program for cleaning up rivers; making them clean enough for swimming in a decade, and then eliminating water pollution altogether by 1985.

For towns and cities across the state, the new federal water pollution control law requires that municipal wastewater treatment plants include facilities for the secondary treatment of sewage. All treatment facilities must be in operation by mid-1977. By mid-1983, municipal wastewater plants will be required to use advance treatment, including if practicable, the reclaiming and recycling of wastewater.

Municipalities and water pollution control districts must obtain a permit to discharge wastewater, issued jointly by the Massachusetts Division of Water Pollution Control and the federal Environmental Protection Agency. (Upon approval from the EPA, Water Pollution Control will administer the permit program in the Commonwealth.) Permits will require construction and operation of treatment facilities to meet the 1977 and 1983 requirements.

Under the new bill municipalities will receive a 75 percent federal grant for the construction costs of treatment plants. With Massachusetts planning to amend the state water pollution law to add an additional 15 percent, total federal-state grants for constructing plants should run to 90 percent of the costs.

Industries, like municipalities, are required to obtain permits from Water Pollution Control and the EPA. To comply with the conditions of the permits, industries will have to construct and operate facilities to treat wastewater before discharging it into waterways. By mid-1977 every

industry using the "best practicable technology" currently available, must meet certain effluent limitations. Effluent limitations are the levels to which specific pollutants must be reduced for discharge into waterways. By mid-1983 industries will have to meet even stricter effluent limitations through the use of the "best available technology."

## MUNICIPAL WASTEWATER TREATMENT

Under the Massachusetts Clean Waters Act, a state grant program was established in 1968 to assist communities in the construction of wastewater treatment facilities. Chapter 687 of the Acts of 1966 (amended by Chapter 747 of the Acts of 1970) provided a \$150 million bond issue over a ten-year period (with a \$15 million limit in any fiscal year) to be used for grants and other purposes. Chapter 747 of the Acts of 1970 provided an additional \$250 million bond issue for construction grants, comprehensive planning grants and the prefinancing of federal grants.

State program grants in fiscal 1973 were allocated to the following categories:

Comprehensive planning of wastewater treatment facilities .....0

Preparation of final plans and specifications for wastewater treatment facilities .....\$471,000

Construction grants for wastewater treatment facilities .....\$10,590,000

Prefinancing of federal grants .....\$4,099,000

The Massachusetts Clean Waters Act also provided a reimbursement program to communities constructing wastewater treatment facilities prior to September 1966. Funds for this program, which are appropriated annually, come from the Local Aid Fund. Total payments in fiscal 1973 were \$1,153,000.

In addition to state grants, Water Pollution



Control approves federal grants made by the Environmental Protection Agency to municipalities and political subdivisions for the construction of wastewater treatment facilities. Funds allocated to Massachusetts for fiscal 1973 were \$187 million. Under the old Federal Water Pollution Control law (in effect until October, 1972) federal grants provided up to 50 percent reimbursement of the construction costs of wastewater treatment facilities. An additional five percent grant was allotted if the project met regional planning requirements. Last year, under the old law, EPA approved \$15 million in grants to the state; and under the new law (which increased the federal grant to 75 percent reimbursement), \$164 million was approved.

In the coming years the results of these water pollution abatement projects should become evident. For example, the cities of Lowell, Lawrence and Haverhill and adjacent communities, are in the process of building regional sewage treatment facilities costing some \$100 million. By 1975, when these facilities go into operation, the Merrimack River should once again become suitable for recreation, fishing and aesthetic enjoyment.

On the Nashua River, the city of Fitchburg, in cooperation with local industries, has begun construction of two municipal-industrial wastewater treatment facilities costing \$30 million. Construction of these plants and other smaller facilities, scheduled for completion in late 1973, will enable major restoration of the river.



Model of wastewater treatment plant by Camp, Dresser & McKee, Inc.



Monitoring station, Westfield River

## INDUSTRIAL WASTE PROGRAM

The Division's Industrial Waste Section works with industries to insure installation of the most efficient pollution abatement facilities. Its primary function is to review engineering reports and plans for industrial waste treatment projects. Additional activities include inspecting newly operating industrial treatment plants, locating new sources of pollution, and establishing implementation schedules for industries. Last year, 56 sources of industrial wastewater pollution were abated, bringing the total to 297 since the beginning of the program.

During the year the transition to a permit program under the Federal Water Pollution Control Act Amendments of 1972 began. The program, currently administered jointly by Water Pollution Control and the EPA in Massachusetts, requires that industries' wastewater discharged meet specific levels of effluent limitations by 1977 and stricter levels by 1983. EPA is currently establishing national guidelines for effluent limitations on an industry-by-industry basis. Last year Water Pollution Control and the EPA began developing effluent limits for the Massachusetts paper industry — the first of several categories of wastewater effluent limitations to be established.



## OIL POLLUTION CONTROL AND HAZARDOUS WASTES

Under Chapter 648 of the Acts of 1968, Water Pollution Control is responsible for cleaning up any oil spills in Massachusetts waters. Costs for these cleanups average several million dollars annually. The great majority of oil spills are cleaned up by the person responsible for the spillage. Only in cases where the origin of the spill is unknown or the person responsible fails to act does the Division initiate cleanup and recover expenses whenever possible. The U.S. Coast Guard has also begun to clean up oil spills on a similar basis, reducing dependence on state funds. The cost of oil spill cleanups by the Division was \$70,000 last year.

In accordance with Chapter 692 of the Acts of 1970, Water Pollution Control is responsible for defining and controlling hazardous wastes generated within the Commonwealth. Last year the Division implemented regulations designed to cover handling and disposal methods involving conveyance of hazardous wastes by truck, rail or vessel from point of origin to disposal areas on land or in water. To date, approximately 40 firms have been licensed under this act.



## WATER QUALITY MANAGEMENT

The Water Quality Management Section surveys, analyzes and reports on the condition of the Commonwealth's waters. In addition, the Section evaluates proposed treatment facilities for their effectiveness in meeting water quality standards. The Section also, in accordance with the new federal regulations for construction grants, develops basin plans for river systems and determines whether grant requests conform to the basic plan.

Last year the Section completed a water quality management plan for the Taunton River Basin. (It is one of the first plans from a New England state to be filed with the U.S. Environmental Protection Agency under the requirements of the new federal Water Pollution Control Act). It means that a coordinated program and funding to upgrade the Taunton and its tributaries can now get underway.





The plan calls for the basin to be divided into seven water pollution abatement districts. Each district will be required to upgrade or build municipal wastewater treatment facilities incorporating secondary, and in most cases, advanced treatment in order to meet water quality standards. Industries will be encouraged to pre-treat wastes and tie into municipal facilities or else build their own wastewater plants. The Taunton plan is only the first of many basin plans required under the new federal law.

Last year several water surveys were also conducted and final reports were published on the following:

French River  
Quinebaug River  
Concord River

Connecticut River  
New Bedford Harbor



## OPERATION AND MAINTENANCE

Proper operation and maintenance of treatment facilities is necessary if the water pollution abatement program is to succeed. The most effectively designed plant will not function satisfactorily if it is not properly operated and maintained. The most difficult problems arise with outmoded or overloaded plants. Although these plants are scheduled for replacement or upgrading, in some instances it may take up to six years for this to be accomplished. To insure proper operation and maintenance of existing, as well as new facilities, the Division conducts wastewater treatment plant inspections, requires operator certification and promulgates rules and regulations to bring plant operations into accordance with water quality standards.

## RESEARCH

The Division awards research and demonstration grants related to improved methods of water pollution abatement. Last year about \$1.8 million in contracts were awarded, bringing the total of contracts awarded since 1968 to nearly \$4 million. Among the major research and demonstration projects initiated last year were the following:

- Three-year \$700,000 grant to Cleverdon, Varney and Pike to develop advanced wastewater treatment methods.
- Three-year \$480,000 grant to the Woods Hole Oceanographic Institute to develop a wastewater Renovation and Retrieval System for Cape Cod.
- In conjunction with the University of Massachusetts, a three-year \$238,000 grant to the University's Department of Civil Engineering to conduct pilot plant investigations of phosphorous and nitrogen control in wastewater treatment plants.





Fossil fuel power plant on the Cape Cod Canal

## THERMAL POLLUTION CONTROL

The Division reviews applications for new discharge permits from electric power companies. One of the requirements for a permit is that an environmental study be conducted for each plant site. The study must include assurance that water quality standards will be maintained. If any water pollution violation results from such discharges, the Division can amend the permit conditions to obtain abatement. Last year special environmental studies were undertaken at New England Power Company sites on Lynn Harbor, Mt. Hope Bay and Salem Harbor, and Boston Edison sites on Cape Cod and Plymouth Bay.

Throughout the state, regional teams from Water Pollution Control investigate complaints of water pollution, supervise progress on pollution

abatement projects, survey wastewater treatment plants to provide data on operating efficiency, and conduct operator training courses.

Regional offices are located at the following:

**Metropolitan and Northeast Region, Boston (727-3855)** — covers Boston Harbor and Lower Charles, Mystic and Lower Neponset, Blackstone, Merrimack, Parker and Ipswich River Basins as well as North Shore Coastal area.

**Southeast Region, North Pembroke (826-2424)** — covers Upper Charles, Ten Mile, Upper Neponset and Taunton River Basins as well as the South Shore Coastal area, including Cape Cod and the islands.

**Western Region, Amherst (413-549-1755)** — covers the Hoosic, Housatonic, Connecticut, French and Quinebaug River Basins.



# division of WATER RESOURCES

Water is one of our most precious resources. It affects our lives through the hydrologic cycle. Precipitation in the form of rain or snow falls to the earth's surface, sustaining life, entering the groundwater supply or replenishing lakes and streams that flow to the ocean. From there, as water evaporates into the air to form precipitation once again, the cycle is completed.

Our water resources are limited, however, and must be carefully managed and protected as man continually interrupts the cycle to use water for agriculture, industry and domestic consumption. The Division of Water Resources assists in the planning, management and protection of this vital resource through its programs of managing small watersheds, conducting studies in water supply and flood control, data gathering and wetlands regulation.

## SMALL WATERSHED MANAGEMENT

Under the Watershed Protection and Flood Prevention Act (P.L. 566), the federal government is authorized to grant technical and financial assistance to local organizations planning and constructing watershed projects for the purpose of flood prevention, water supply, recreation, or fish and wildlife development. The Division assists local agencies in the planning, land acquisition, construction and maintenance of these watershed projects.

One fine example of a small watershed project is now being developed on the Sudbury, Assabet and Concord Rivers in eastern Massachusetts. Upon completion, the SuAsCo project, a complex of dams and reservoirs, will provide increased flood protection, wildlife habitat and open space. It will also improve the low flow condition of these rivers by collecting and holding water for release during the dry summer months. (This flow augmentation



Minuteman Monument during the flood of March 1968

improves fisheries and water quality by providing more water in the rivers during dry periods.)

Other small watershed projects now in progress are located on the Clam River in Sandisfield, Quaboag River in the Brookfield area; on the West Branch of the Westfield River in the central Berkshires; and on Bradley Brook in Blandford, Washington Mountain Brook in Washington, and Baiting Brook in Framingham.

## WATER RESOURCES STUDIES

In conjunction with federal and regional agencies and other states, the Division is participating in several water resources studies. Among these are the following inter-state studies:

- The Northeast Water Supply Study (NEWS) involves investigation, under the direction of the U.S. Army Corps of Engineers, of methods for augmenting the water supply of eastern Massachusetts in order to meet projected needs in this region.
- The Southeast New England Study (SENE) is concerned with a broad examination, with public participation of methods, programs, projects and uses of water and related land resources in Rhode Island and eastern Massachusetts, including Cape Cod.
- The Connecticut River Supplementary Study (begun last year as a continuation of a comprehensive Connecticut River Study completed





Snow monitoring station, Berlin, Massachusetts

by the U.S. Army Corps of Engineers) involves an examination of flood management and attendant problems of environmental impact.

Among the in-state studies currently underway are the following:

- Participation with the Metropolitan District Commission in planning for further development of MDC's water supply and distribution system.
- In conjunction with the U.S. Geological Service, a program of compiling groundwater maps and hydrologic data atlases for assessing groundwater potential in Massachusetts. So far, maps and atlases have been completed for over half the state.
- A study, conducted by the U.S. Department of Agriculture's Soil Conservation Service and financed in part by the Division, to collect information of Massachusetts water resources for potential reservoir sites, wetlands protection, land use projections, flood control and recreation.

Completed last year were:

- A study of the public water supply resources of the Parker River Watershed.
- Also completed was a study, in cooperation with MDC, Department of Public Health and the Central Massachusetts Regional Planning Commission, of the future water needs of Worcester County.

### BASIC DATA COLLECTION

To survey water resource conditions, the Division maintains a system of over 200 rainfall monitoring stations throughout the Commonwealth. Rain gages are maintained with the cooperation of dedicated citizens. Precipitation is recorded and the readings are sent to Division headquarters in Boston. Additional precipitation records and analysis are provided by the state climatologist who is now in the Division.

Heavy precipitation, along with wet surface conditions can produce floods. Such conditions frequently occur in the winter and early spring when rain falls upon the frozen ground. To evaluate flood potential and provide a flood warning system, the Division also maintains 20 snow monitoring stations across the state, and in cooperation with the U.S. Army Corps of Engineers, collects and interprets the data.

### WETLANDS REGULATION

Another aspect of flood control involves wetlands regulation. Most wetlands serve as natural flood control devices: they can moderate surface runoff of rainwater, slowly recharge groundwater supplies and streams, prevent or reduce flood damage, and provide an important wildlife habitat. Water Resources, in cooperation with the Division of Conservation Services, administers the Wetlands Protection Act (Chapter 131, Section 40). The Division provides technical review of applications to dredge, fill or alter a wetland. These reviews assess what impact proposed activity on wetlands would have on the hydrology, drainage, flood control or groundwater of an area.



# office of ENVIRONMENTAL PROTECTION

In Massachusetts, more than 7.5 million tons of solid waste, amounting to seven pounds per person per day, were generated in 1970. This total is expected to exceed 8.7 million tons in 1975 and nearly 16 million tons by 2000. At the same time, more than 90 percent of the 351 communities in the state are processing solid waste in an unsatisfactory manner; moreover, the amount of land available for solid waste disposal is fast diminishing.

To deal with the mounting solid waste crisis, the Office of Environmental Protection, functioning under the Water Resources Commission, was established in 1972. At its inception, the Office assisted the Bureau of Solid Waste Disposal of the Department of Public Works in reviewing a solid waste study being prepared at that time by the Raytheon Service Company. The Raytheon report recommended the establishment of solid waste districts throughout the state. In each district solid waste management systems would be organized which would be responsive to the needs of the communities comprising the district.

A series of open informational meetings were held throughout the state to discuss with the public the contents of the Raytheon study and assess local needs and desires relating to the state's role in solid waste management. Then, based on accumulated studies and data on solid waste, including information gathered from public hearings, an inter-agency Planning Unit, under the direction of the Solid Waste Council, representing the Departments of Public Health, Public Works, Natural Resources and Community Affairs, was established. The task of this Planning Unit, which was spearheaded by the Office of Environmental Protection, was to develop a solid waste management plan for the Commonwealth.

The following are highlights of this solid waste plan made public in 1973:

- Development of mandatory regions for the handling of solid waste processing and disposal throughout the state.
- Implementation of a statewide transfer station concept.
- Development of a comprehensive resource recovery program.
- Implementation of the regional system on a phased-basis coordinated through the regional planning agencies.
- Consolidation of the state solid waste administration.
- Development of an adequate funding program to operate the system and to provide assistance to municipalities.



Massachusetts disposes of 7.5 million tons of solid waste each year.



# PUBLIC ACCESS BOARD

Ever since colonial times citizens have been entitled to the right of public access to the waters of the Commonwealth. As long as private property was not cultivated, it could be crossed in order to gain access to great ponds and navigable rivers. Over the decades though, private development, particularly the construction of summer homes, proliferated around lakes and along the coast. In addition to this development, the affluence after World War II gave rise to an unprecedented boating boom. The result was that much of the water's edge became built up. Fishermen and boatmen, especially small-boat owners who stored their 15-foot crafts in their backyards and hauled them by trailer over the highways, found themselves increasingly unable to gain access to public waters.

By 1962 the housing development and boating boom along Massachusetts' lakes and coastline had become so great that the state established the Public Access Board functioning in the Department of Natural Resources. The Board's task is to provide both launching facilities and water access. Since its inception the Board has built throughout the Commonwealth, 85 boating sites on freshwater ponds and streams and along the coast.

Last year several new ocean sites that should help relieve the pressure for public access in the Boston and North Shore area were opened. On Winthrop Harbor in Winthrop, a site with parking facilities for 105 cars and trailers, costing about \$235,000, was opened. Besides its use as a boat launching location, added benches and lighting has made the site an excellent place to view the harbor. On Porter River in Danvers, a site costing \$138,000 was developed with the assistance of local authorities to accommodate 40 cars and trailers. And on the Little Mystic Channel in Charlestown, a site costing \$138,000, was opened for 37 cars and trailers. The Boston Redevelopment Authority, on whose land the Charlestown site was constructed, plans to develop additional recreational facilities on the location.

Currently in the planning stage are sites for:

Cashman Park in Newburyport

Webster Lake in Webster

Taunton River in Raynham

North Pond in Hopkinton

Hamblin Pond in Barnstable

Plymouth Harbor in Plymouth

Lake Winthrop in Holliston

Although the demand for boating facilities continues to grow, popular interest in ecology, as well as concern about the over-crowded water-based recreation conditions (the very conditions that gave rise to the Board in the first place), have resulted in some opposition to the Board's activity.

Many people fear that the construction of public boat launching ramps generates more pollution, creates greater congestion, and further despoils the landscape. These concerns have prompted the Board to involve a wider segment of the public in the planning process. Previously sportsmen, individual landowners and town officials were the only people involved. The Board encourages all concerned individuals to attend public meetings and express their views. Last year, Chatham, Webster and Plymouth were among the growing number of towns seeking to play a more active role in determining public access sites within their municipal borders.

The Public Access Board embarked on a new program last year to develop small boat launchings especially adaptable for canoeing — an outdoor activity now enjoying an immense revival. Several sites, which will be lightly developed or kept in their natural state, are being considered along the Taunton and Charles Rivers. Of special significance was the Board's acquisition last year of a location on the Indianhead River in Hanover. This site, acquired jointly with the Hanover Conservation Commission and the Plymouth County Commissioners, is on one of the cleanest rivers and, with its excellent stocks of shad, trout and newly-introduced coho salmon, offers one of the best fishing rivers in the Commonwealth.



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TO:

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